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NEW STAGE IN THE DEVELOPMENT OF MEDICAL BIOLOGY

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Dr Med Sci

Michurin biology, which solves fundamental problems of the growth of the organism on the basis of the latter's relationships, changeability, and relation to its environment, has extirpated Weismann's concepts aiming to establish the immutability or persistence of heredity, has proved that heredity can be changed, and has disproved the existence of disease "genes" and "heredity incurable diseases.

Now, 3 years after the session of the All-Union Academy of Agricultural Sciences imeni V. I. Lenin (VASKhNIL) and a year after the joint Pavlov session of the Academy of Sciences USSR and the Academy of Medical Sciences USSR, the lines of development of Soviet biology have become clear. In general and agricultural biology T. D. Lysenko and the Michurinites have made positive changes, while Prof O. B. Lepeshinskaya, Acting Member of the Academy of Medical Sciences USSR, has conclusively shattered the reactionary dogma of Virchow, which has led to the stagnation of many medical specialties.

Lepeshinskaya has proved convincingly that cells can be formed not only by division of cells, but also from material not having cellular structure. She has aided biological and medical workers to understand the cause and processes involved in qualitative changes in the development of the living organism, both in phylogenesis and ontogenesis.

The May 1950 meeting of the biological department of the Academy of Sciences USSR, in which the most eminent USSR scientists took part, rated Lepeshinskaya's work as an important discovery and recommended that biologists and medical workers give wider coverage to problems related to the development of cells and to investigations of noncellular forms of life.

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In a comparatively short time the work of O. B. Lepeshinskaya has advanced greatly. More than 60 lines of investigation being pursued at present at the institutes and laboratories of the Academy of Medical Sciences are related to further study of the problems put forward in Lepeshinskaya's work. About 30 lines of investigation are being followed under her leadership in the Division of Cytology and other laboratories of the Institute of Experimental Biology. Moreover, research related to development of Lepeshinskaya's work is being carried on in many institutes of the Academy of Medical Sciences USSR, in scientific research and medical institutes of the Ministry of Health USSR and ministries of union republics, as well as institutes of the Academy of Sciences USSR and of VASKhNIL. Already new data have been obtained which is of interest from the view of further development of problems brought up by Lepeshinskaya's work.

M. D. Skobel'skiy, an associate at the Division of Cytology which she heads, has established that biological structures can develop under appropriate conditions in blood plasma which possesses no cellular elements. Investigations by Lavrov of the Rostov Medical Institute have proved that certain specialized cells can be transformed over living matter into cells of another type.

Polezhayev and others have demonstrated that certain organs of amphibians are regenerated under definite conditions by the formation of new cells from living matter rather than by division of cells. Prof L. I. Falin of the Smolensk Medical Institute reports that a review of his previously obtained data on teratomas led him to conclude that these tumors are formed by destruction of the normal tissue, followed by formation of cancerous cells from living matter. Of exceptional interest are the works of I. Ye. Glushchenko and other scientific associates of VASKhNIL, which have shown that not division of old cells, but rather so-called scar formation is responsible for the regeneration of tissues on injury to the tuber of a potato and for the growth of new rootlets by willow or black currant stalks. It is interesting that young cells formed by plants in the course of these processes are at first completely without nuclei, which are formed considerably later. K. M. Zavadskiy's work has established that begonia shoots are formed not by mitosis, but by the growth of new cells from living substance of protoplasm. It has been thus demonstrated that in plants qualitatively new cells are formed not by simple mitotic division, but rather through formation of new, undifferentiated cells having superficial resemblance to yolk spheres in the growth of animal embryos.

The victory of the Michurin's doctrine resulted in significant theoretical shifts in microbiology, where a wide range of investigations on the mutability of microbes was carried out subsequent to condemnation of the views of investigators who took the Morganistic-Weismannistic positions of Kriviskiy, Ravich-Birger, etc. Recently, books have come out generalizing the vast experience of our native investigators. USSR microbiologists in their works are again posing questions of the growth and development of microbes, the interrelation between viruses and bacterial forms of microbes, and the significance of filtered forms of microbes. Intensive work is being carried out in studying the development of new species and crystallization of living matter of viruses and bacteria. An interesting discussion in print has revolved around questions brought up in books and articles by G. M. Bosh'yan, Kalina, Academician Muromtsev, Krestovnikova, and others. Making themselves heard with new force are the works of the remarkable Russian scientist D. I. Ivanovskiy, who first discovered viruses in 1892, and the investigations of the outstanding USSR scientist, the Academician N. F. Gamaleya, who discovered the phenomenon of bacteriography proving the existence of living matter which does not have cellular structure. Not only was this outstanding work passed over for a long time, but some foreign scientists have attempted to appropriate it.

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As is well known, Ivanovskiy showed in his works that viruses are living things which are able to crystallize. In addition, new research has increased the significance of the work of V. V. Suknev, V. D. Timakov, and others on the existence of filterable forms of various pathogenic and saprophytic microbes as well as some of the simplest spirochetes. It was proved not only that bacterial forms transform into filterable forms which have no cellular structure and are no more than blobs of living matter, but also that filterable forms transform back into cellular bacterial forms. Study of the mutability of microbes has lead to the creation of new types of vaccines against tularemia and brucellosis (N. A. Gayskiy, P. A. Vershilova, et al.).

Workers at the Saratov Institute of Microbiology proved it possible to transform microbes of one species into another. In passing on this question, the expanded session of the Presidium of the Academy of Medical Sciences USSR, with the participation of the most eminent microbiologists and biologists, recognized the indisputability of the factual data presented by the institute. The works of N. F. Gamaleya and N. P. Gracheva, as well as those of V. D. Timakov and D. G. Kudlay, showed the possibility of obtaining mutability in microbes which is similar to vegetative hybridization in plants.

It is impossible to overestimate the tremendous significance which all investigations in this direction will have not only for the further development of science, but also for practical applications in the field of public health.

Significant theoretical shifts have occurred in the field of immunology. It is becoming clearer all the time that immunity phenomena are general biological relationships which have an important part in the processes of growth and development of living organisms.

This view, developed by the founder of modern scientific immunology, I. I. Mechnikov, and reflected in numerous works of USSR immunologists, has been advanced greatly in the research work of the Institute of Experimental Biology, Academy of Medical Sciences USSR. Considering immunity from the general biological standpoint, the work of Michurin and Pavlov has raised immunology to a higher stage in its development.

Starting with the great scientific legacy of I. V. Michurin and I. P. Pavlov, who proved the unity of the organism with its environment, USSR investigators have achieved new successes in the development of immunology.

On the basis of data obtained by Pavlov and his students, K. M. Bykov, A. G. Ivanov-Smolenskiy, I. F. Razenkov, A. D. Speranskiy, M. A. Usiyevich, and V. N. Chernigovskiy, and data of other progressive native physiologists (N. Ye. Vvedenskiy and A. A. Ukhtomskiy), USSR scientists G. V. Vygodchikov, A. D. Ado, P. F. Zdrodovskiy, A. P. Gordiyenko, A. Ya. Alymov, Podkopayev, and others have shown that immunological reactions of the organism obey general physiological laws entirely and are regulated by the central nervous system and its highest subdivision, the cortex of the large brain. This work sheds considerable light on one of the most involved problems of immunology, allergy, which was originally examined from a purely Virchowian standpoint. This reactionary theory explained the development of allergies and other immunity reactions as merely the interaction of an antigen with individual cells and systems of tissue or by the humoral factor independent of disturbances of the regulating function of the central nervous system. They held, for example, that anaphylaxis was one thing, while allergy was another. According to them, all reactions involving supersensitivity of the organism (e.g., the so-called phenomenon of P. F. Zdrodovskiy, Sanarelli, and Shvartsman of supersensitivity to individual substances during certain diseases) are completely different things, having no connection with the central nervous

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system. American investigators have concluded that anaphylaxis is restricted to animals, while allergy affects humans only, whereas all the experimental data and observations refute this view.

Attempting unsuccessfully to lead knowledge about allergy out of a blind alley, many investigators, such as Sh. D. Moshkovskiy, tried to create new classifications using very fancy terminology: "allobiosis," "normergy," etc. This just complicated the problem further.

The investigations of USSR scientists show that immunological reactions are brought about exclusively by the interaction of an antigen with the sensitive nerve receptors found in the skin and internal organs of animals and man. All research of USSR scientists in the last few years compels us to assume that the phenomena of immunity, supersensitivity to different substances during various diseases, and anaphylaxis, as well as the phenomenon of Sanarelli and Shvartsman, and all other reactions of the skin to the introduction of allergens have one common source: changed reactivity of the organism resulting from disturbance of the regulating effect of the central nervous system. The observed diversity of immunobiological reactions of an organism under allergic conditions depends on the characteristics of the organism, its interaction with its surroundings, and the character of the action of the irritant.

There is no doubt of the dependence of allergic reactions on the central nervous system. It is well known that in 1902 Nenredka established by experiment that allergy in an animal could be removed by narcosis. N. A. Gayskiy demonstrated that it is impossible to call forth an allergic reaction by the introduction of tularin into a suslik /species of Citellus/ in the state of hibernation, although the animal exhibits an allergic condition toward the causative factor of tularemia otherwise /i.e., when awake/.

The brilliant postulates of I. P. Pavlov and I. V. Michurin concerning the unity of the organism and all its functions with its environment and the discoveries of O. B. Lepeshinskaya have given investigators new methods of approach to the study of the growth of neoplasms taking place in the organism as a result of pathological processes. USSR scientists have decisively refuted the Virchowian concepts, on the basis of which cancer is considered to be a localized process. Moreover, in the last few years there has been a continuous accumulation of data pointing to a connection between malignant tumors and the presence of viruses.

We have touched on only a few of a great number of problems which are of exceptional importance to medicine. The Michurin doctrine, founded on the great ideas of Lenin and Stalin, has brought our biology and medicine close to the discovery of the causes of qualitative changes in organisms and the processes of their development.

However, in many fields of medicine a revision of obsolete views and attitudes is still needed.

There is no doubt that in this direction, the only true path, we will achieve further development of the remarkable form of relation between Michurin biology and medicine represented by the great doctrine of I. P. Pavlov, and will raise medical science to new, greater heights.

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